WHAT IS CLAIMED IS:

1. A method for conducting a multiplex assay for determining absorption, distribution, metabolism, and/or excretion properties of an analyte, comprising:

(a) providing a device comprising (i) a substrate having a plurality of substantially parallel individual test lanes on the surface thereof, wherein each test lane comprises a plurality of living cells immobilized therein, and the living cells within any one test lane are of the same type, (ii) at least one inlet for introduction of a carrier fluid into the device, (iii) a means for controlling delivery of the carrier fluid onto and across the substrate surface, and (iv) an analyte source for introducing the analyte into the carrier fluid;

(b) introducing the analyte from the analyte source to at least one test lane by controlled delivery of a carrier fluid containing the analyte so that the analyte is maintained by laminar flow within a predetermined flow path, thereby contacting the living cells immobilized in at least one of the test lanes;

(c) detecting a change, when present, in the immobilized cells, the analyte, or both, resulting from the contact; and

(d) correlating any change detected in (c), or lack thereof, to an absorption, distribution, metabolism, and/or excretion property of the analyte.

2. The method of claim 1, carried out with multiple analytes.

3. The method of claim 2, wherein steps (b), (c) and (d) are repeated with multiple analytes.

4. The method of claim 2, wherein the carrier fluid containing the analyte flows in a direction substantially perpendicular to the test lanes.

5. The method of claim 2, wherein the carrier fluid containing the analyte flows in a direction substantially parallel to the test lanes.

6. The method of claim 1, carried out with a single analyte and wherein each test lane contains different cells with respect to the other test lanes.

7. The method of claim 6, wherein the carrier fluid containing the analyte flows in a direction substantially perpendicular to the test lanes.

8. The method of claim 6, wherein the carrier fluid containing the analyte flows in a direction substantially parallel to the test lanes.

9. The method of claim 1, wherein the living cells are immobilized as a confluent monolayer within each test lane.

10. The method of claim 1, wherein the living cells are immobilized as a subconfluent monolayer within each test lane.

11. The method of claim 1, wherein the living cells are primary cells.

12. The method of claim 11, wherein the primary cells are mammalian.

13. The method of claim 1, wherein the living cells immobilized in at least one test lane are selected from the group consisting of blood cells, stem cells, endothelial cells, epithelial cells, bone cells, liver cells, smooth muscle cells, striated muscle cells, cardiac muscle cells, gastrointestinal cells, kidney cells, nerve cells, and cancer cells.

14. The method of claim 13, wherein the living cells immobilized in at least one test lane are selected from the group consisting of liver cells, gastrointestinal cells, endothelial cells, and kidney cells.

15. The method of claim 14, wherein the cells are liver cells.

16. The method of claim 14, wherein the cells are endothelial cells.

17. The method of claim 16, wherein the endothelial cells are brain microvascular endothelial cells.

18. The method of claim 1, wherein the analyte is selected from the group consisting of drugs, drug candidates, pharmaceutical excipients, pharmaceutical excipient candidates, and combinations thereof.

19. The method of claim 1, wherein the analyte is selected from the group consisting small drug molecules, amino acids, amino acid analogs, peptides, proteins, nucleotides, nucleosides, oligonucleotides, antibodies, and conjugates thereof.

20. The method of claim 2, wherein each of the multiple analytes is independently selected from the group consisting of drugs, drug candidates, pharmaceutical excipients, pharmaceutical excipient candidates, and combinations thereof.

21. The method of claim 2, wherein each of the multiple analytes is independently selected from the group consisting small drug molecules, amino acids, amino acid analogs, peptides, proteins, nucleotides, nucleosides, oligonucleotides, antibodies, and conjugates thereof.

22. The method of claim 1, wherein the analyte is contained in the carrier fluid in solvated form.

23. The method of claim 1, wherein the analyte is contained in the carrier fluid in partially solvated form.

24. The method of claim 1, wherein the analyte is contained in the carrier fluid in suspended form.

25. The method of claim 1, wherein the analyte is coupled to a label.

26. The method of claim 25, wherein the label is selected from the group consisting of fluorescers, radiolabels, enzymes, enzyme substrates, chemiluminescers, dyes, and photosensitizers.

27. The method of claim 1, wherein the substrate is made from glass.

28. The method of claim 1, wherein the carrier fluid comprises a medium appropriate to sustaining living cells.

29. The method of claim 1, wherein in the change detected in step (c) is absorption of the analyte by at least one of the plurality of cells.

30. The method of claim 1, wherein the change detected in step (c) is metabolite formation.

31. The method of claim 1, wherein no change is detected in step (c).

32. The method of claim 1, wherein the substrate comprises at least 3 test lanes.

33. The method of claim 32, wherein the substrate comprises at least 10 test lanes.

34. The method of claim 1, wherein the analyte is introduced via hydrodynamically focused flow.

35. The method of claim 2, wherein multiple analytes are each introduced via hydrodynamically focused flow.

36. The method of claim 35, further comprising in step (a): providing a fluid vessel having a cavity extending from an inlet opening to an outlet opening; sequentially loading multiple fluids, each fluid containing a different analyte; sequentially releasing through the inlet opening into the cavity, wherein the sequence is selected to correspond to a predetermined release sequence of the analyte; and expelling the loaded fluid through the opening and out the vessel to produce a stream of fluid that exhibits the predetermined release sequence.

37. The method of claim 1, wherein the analyte is introduced via a plurality of introduction channels, each associated with an individual analyte outlet.

38. The method of claim 2, wherein each of the multiple analytes is individually introduced via a plurality of dedicated introduction channels, each introduction channel associated with an individual analyte outlet.

39. The method of claim 1, wherein the analyte is introduced via an analyte-containing matrix located upstream from the test lanes and adapted to release analyte into the carrier fluid as the carrier fluid flows over the analyte-containing matrix.

40. The method of claim 2, wherein each of the multiple analytes is individually introduced via a plurality of analyte-containing matrices, each located upstream from the test lanes and adapted to release each of the multiple analytes into the carrier fluid as the carrier fluid flows over each of the analyte-containing matrices.

41. A device for conducting a multiplex assay for determining absorption, distribution, metabolism, and/or excretion properties of an analyte, comprising:

(a) a substrate having a plurality of substantially parallel individual test lanes on the surface thereof, wherein each test lane comprises a plurality of living cells immobilized therein, and the living cells within any one test lane are of the same type;

(b) at least one inlet for introducing a carrier fluid into the device so as to enable contact between the carrier fluid and the substrate surface;

(c) an analyte source for introducing the analyte into the carrier fluid;

(d) a means for controlling delivery of the carrier fluid so as to enable the analyte to be maintained by laminar flow within a predetermined flow path, thereby providing for contact of the living cells immobilized in at least one of the test lanes; and

(e) at least one outlet enabling removal of fluid from the device.

42. The device of claim 41, further comprising a means for detecting a change, or lack thereof, in the immobilized cells, the analyte, or both, resulting from the contact of the living cells with the analyte.

43. The device of claim 41, wherein the means for detecting a change is selected from the group consisting of optical imaging systems, microscopes, chromatographers, mass spectrometers, immunoassays, fluorescence detectors, scintillation counters, gamma counters, autoradiographers, films, nuclear magnetic resonance devices, infra-red detectors, and spectrophotometers.

44. The device of claim 41, further comprising a fluid vessel having a cavity extending from an inlet opening to an outlet opening for loading multiple fluids, each fluid containing a different analyte in a sequence through the inlet opening into the cavity.

45. The device of claim 41, further comprising a flow passage.

46. The device of claim 45, wherein the flow passage is further defined by a cover plate having a surface that opposes the surface of the substrate.

47. The device of claim 41, wherein the substrate is detachable.

48. The device of claim 41, wherein the substrate is substantially planar.

49. The device of claim 47, wherein the substrate and cover plate surfaces are substantially planar.

50. The device of claim 46, wherein the substrate and cover plate surfaces are located about 1 μm to about 500 μm from each other.

51. The device of claim 50, wherein the substrate and cover plate surfaces are located about 20 μm to about 100μm from each other.

52. The device of claim 45, wherein the flow passage is further defined by opposing sidewalls in fluid-tight contact with the substrate.

53. The device of claim 52, wherein the sidewalls are substantially parallel to each other.

54. The device of claim 41, wherein the means for controlling delivery of the carrier fluid in laminar flow is adapted to provide constant velocity flow.

55. The device of claim 41, further providing an additional inlet for the introduction of a stream of reagent into the carrier fluid upstream from the test lanes.

56. The device of claim 41, wherein the substrate surface comprises a cell-adhering site.

57. The device of claim 56, wherein the cell-adhering site comprises a biological material that facilitates attachment of a living cell.

58. The device of claim 57, wherein the biological material is collagen.

59. The device of claim 41, wherein the means for controlling delivery of the carrier fluid comprises two guide stream inlets for introducing guide streams, and further wherein the

carrier fluid inlet and the guide stream inlets are positioned such that the carrier fluid is interposed between the guide streams.

60. The device of claim 59, wherein the means for controlling delivery of the carrier fluid further comprises means for controlling flow rates of the guide streams such that the carrier fluid is hydrodynamically focused.

61. The device of claim 41, wherein the analyte source comprises a plurality of introduction analyte outlets.

62. The device of claim 41, wherein the analyte source comprises an analyte-containing matrix, wherein the analyte-containing matrix is located upstream from the test lanes and adapted to release analyte into the carrier fluid as the carrier fluid flows over the analyte-containing matrix.

63. The device of claim 62, wherein the analyte source comprises a plurality of analyte-containing matrices, wherein each analyte-containing matrix is located upstream from the test lanes and adapted to release analyte into the carrier fluid as the carrier fluid flows over the analyte-containing matrix.